

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Chih-Chien Liu, et al

Serial No. Unassigned

Filed: November 20, 2001

For: HIGH DENSITY PLASMA
CHEMICAL VAPOR DEPOSITION
PROCESS

Examiner: Unassigned

Art Unit: Unassigned

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
2900 Crystal Drive
Arlington, VA 22202-3513

Sir:

Please amend the copy of U.S. Patent Application Serial No.
09/546,174 filed herewith, as follows:

IN THE SPECIFICATION:

On page 1, lines 12–13, please amend the specification according to
the attached sheets.

IN THE CLAIMS

Please cancel claims 1–20 without prejudice to the subject matter
recited therein.

Please add claims 21–31 according to the attached Clean Version of
the Amendment.

REMARKS

The amendment adds new claims 21–31 while canceling claims 1–20,
making claims 21–31 pending in the application. Support for the amendment
can be found in the parent application. No new matter has been added by the
amendment.

Please consider the pending claims in light of the references cited in the enclosed Information Disclosure Statement. These references were considered in related U.S. Patent Application Serial No. 09/546,174, filed April 11, 2000, and U.S. Patent Application Serial No. 08/958,460, filed October 28, 1997, now U.S. Patent No. 6,117,345.

William J. Kubida, et al (Customer No. 25235) was appointed the attorney of record in the copending parent case (U.S. Application Serial No. 09/546,174) in a power of attorney filed October 11, 2001 (a copy of which is included herewith). Please confirm that correspondence in this case should be directed to:


William J. Kubida, Reg. No. 29,664
HOGAN & HARTSON LLP
1200 17th Street, Suite 1500
Denver, Colorado 80202

In view of all of the above, claims 21–31 are believed to be allowable and the case in condition for allowance which action is respectfully requested. Should the Examiner be of the opinion that a telephone conference would expedite the prosecution of this case, the Examiner is requested to contact Applicants' attorney at the telephone number listed below.

Applicants enclose herewith the fee for filing a continuation application and believe this to be the only fee required for this amendment and response. Should any additional fees be required, please charge Deposit Account 50-1123.

Respectfully submitted,

November 20, 2001


Eugene J. Bernard, Reg. No. 42,320
HOGAN & HARTSON LLP
1200 17th Street, Suite 1500
Denver, Colorado 80202
Telephone: (303) 454-2457
Facsimile: (303) 899-7333

MARKED-UP VERSION OF THE AMENDMENT

IN THE SPECIFICATION

[This application claims priority from provisional application Serial No. 60/041,790, filed April 2, 1997.] The present application is a continuation of copending U.S. Patent Application Serial No. 09/546,174, filed April 11, 2000, which is a continuation of U.S. Patent Application Serial No. 08/958,460, filed October 28, 1997, now U.S. Patent No. 6,117,345, which claimed priority from U.S. Provisional Patent Application Serial No. 60/041,790, filed April 2, 1997, all the disclosures of which are herein specifically incorporated by this reference.

CLEAN VERSION OF THE AMENDMENT

IN THE SPECIFICATION

The present application is a continuation of copending U.S. Patent Application Serial No. 09/546,174, filed April 11, 2000, which is a continuation of U.S. Patent Application Serial No. 08/958,460, filed October 28, 1997, now U.S. Patent No. 6,117,345, which claimed priority from U.S. Provisional Patent Application Serial No. 60/041,790, filed April 2, 1997, all the disclosures of which are herein specifically incorporated by this reference.

IN THE CLAIMS

21. (New) A method for forming conducting structures separated by gaps on a substrate, comprising the steps of:

- providing a substrate and a wiring layer above the substrate;
- forming a cap layer above the wiring line layer;
- forming a mask layer above the cap layer;
- etching the mask layer to expose selected portions of the cap layer;
- etching the cap layer, and the wiring line layer, at the locations where the cap layer is exposed by the etched mask layer, to form wiring lines separated by gaps, the wiring lines having a remaining portion of the cap layer thereon; and

- depositing a dielectric material within the gaps at a sputtering rate sufficient to fill the gaps, using high density plasma chemical vapor deposition.

22. (New) The method of claim 21, wherein the cap layer comprises a material selected from the group consisting of a silicon nitride material and an oxynitride material.

23. (New) The method of claim 21, wherein a remaining portion of the cap layer on at least one wiring line has a rectangular shape in cross section.

24. (New) The method of claim 21, wherein a remaining portion of the cap layer on at least one wiring line has a trapezoidal shape in cross section.

25. (New) The method of claim 24, wherein the trapezoidal shape includes top and bottom surfaces parallel to one another and side surfaces that extend inwardly from the bottom surface to the top surface.

26. (New) The method of claim 21, wherein the remaining portion of the cap layer on at least one wiring line has a triangular shape in cross section.

27. (New) The method of claim 21, wherein a remaining portion of the cap layer on at least one wiring line has, in cross section, a rectangular shape having its upper comers etched away.

28. (New) The method of claim 21, wherein a remaining portion of the cap layer is partially etched and redeposited into the gaps during the high density plasma chemical vapor deposition process.

29. (New) The method of claim 21, wherein a remaining portion of the cap layer is partially etched during the deposition of a dielectric material using high density plasma chemical vapor deposition.

30. (New) The method of claim 21, wherein the mask layer is a patterned photoresist layer.

31. (New) The method of claim 21, further comprising the formation of a surface layer between the substrate and the wiring line layer, the surface layer being a barrier between the substrate and wiring line layer.

STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: United Microelectronics Corp.

Application No./Patent No.: 09/546,174 Filed/Issue Date: April 11, 2000

Entitled: HIGH DENSITY PLASMA CHEMICAL VAPOR DEPOSITION PROCESS

states that it is:

1. ☒ the assignee of the entire right, title and interest; or
2. ☐ an assignee of an undivided part interest

in the patent application;/patent identified above by virtue of either:

A. ☒ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the Patent and Trademark Office at Reel 8806, Frame 0156, or for which a copy thereof is attached.

OR

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as shown below:

1. From: _____ To: _____

The document was recorded in the Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____

The document was recorded in the Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

3. From: _____ To: _____

The document was recorded in the Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet.

☒ Copies of assignments or other documents in the chain of title are attached.

[NOTE: A separate copy (i.e., the original assignment document or a true copy of the original document) must be submitted to Assignment Division in accordance with 37 CFR Part 3, if the assignment is to be recorded in the records of the PTO. See MPEP 302-302.8]

The undersigned (whose title is supplied below) is empowered to sign this statement on behalf of the assignee.

Date

Larry Lin

Signature
Larry Lin

Typed or printed name
DIRECTOR OF IPR

Title